NewsRelease

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SELF-HEALING AIRPLANES

New devices would detect and fix problems in flight

Imagine driving a car that can detect and diagnose abnormalities, then fix them before they become big problems. Now apply that concept to an even more complex vehicle - the airplane.

The NASA Aviation Safety Program, based at the Langley Research Center in Hampton, Va., wants to make that idea a reality with the help of a number of aviation industry partners.

NASA has selected research proposals from seven teams to develop aviation "health management" and "control upset management" technologies for commercial transports and general aviation aircraft.

"These technologies will help prevent failures that are frequently cited as the primary cause in fatal aviation accidents, such as loss of control in flight and controlled flight into terrain," said Michael Lewis, director of the NASA Aviation Safety Program. "If we can give pilots help by monitoring and correcting vital flight systems then they can make better decisions and have more time to fix critical problems."

NASA asked U.S. companies to submit proposals for research, development, prototyping and implementation of Health Management and Control Upset Management systems, sub-systems and technologies. Industry teams submitted 41 proposals that were evaluated by NASA, Department of Defense and Federal Aviation Administration researchers based on technical merit, cost and feasibility.

NASA has set aside more than $4.6 million to fund health and control upset management projects over the next eighteen months. More money is expected to be designated later to accelerate commercialization and make some systems available within five years. Many of the industry teams are contributing their own matching funds.

The research agreements cover a variety of aircraft health monitoring systems, prevention technologies and components. One team plans to focus on airframes, the "skin and bones" of an aircraft. Another will concentrate on propulsion, a plane's "heart." Others take a more holistic approach.

NASA envisions an integrated computerized health management system that will oversee vital aircraft functions, help prevent and reduce any malfunctions, enhance a flight crew's ability to respond to problems or failures and reduce a pilot's workload in an emergency situation.

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Along with technologies that detect, diagnose and prevent abnormalities NASA wants to help correct potential problems or at least keep them from getting worse. Control upset management systems would include advanced detection/prediction algorithms, display formats, pilot cueing and guidance and control methods to prevent accidents when failures occur.

These seven research agreements are the latest investments being made by the NASA Aviation Safety Program (AvSP) to further a national goal to reduce the fatal aircraft accident rate by 80 percent in 10 years and by 90 percent over two and a half decades. AvSP is a partnership with the FAA, the aviation industry (manufacturers and operators) and the Department of Defense.

The aviation safety initiative was created in the summer of 1997 by NASA Administrator Dan Goldin in response to a report from the White House Commission on Aviation Safety and Security, chaired by Vice President Al Gore. NASA has designated more than $550 million over five years for aviation safety, with more funding expected to follow.

Researchers at four NASA field installations are working with the FAA and industry to develop affordable, implementable technologies to make flying safer: Langley; Ames Research Center in Moffett Field, Calif.; Dryden Flight Research Center in Edwards, Calif.; and Glenn Research Center in Cleveland, Ohio.

Because of advances in the last 40 years commercial airliners are already the safest of all major modes of transportation. But with an accident rate that has remained relatively constant in the last decade and air traffic expected to triple over the next 20 years, the U.S. government wants to prevent a projected rise in the number of aircraft accidents.

For more information on the NASA Aviation Safety Program please check the Internet at:
http://www.hq.nasa.gov/office/aero/oastthp/programs/avsaf/avsafpro.htm

For a complete list of industry teams please check the Internet at:
http://oea.larc.nasa.gov/news_rels/1999/May99/99-024.html

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Health Management/Control Upset Management Industry Teams

Affordable Integrated Management Systems for Aviation Flight Safety Enhancement (AIMSAFE)

Lockheed Martin Tactical Aircraft Systems, Fort Worth, Texas

Gulfstream Aerospace, Savannah, Georgia
American Airlines, Fort Worth, Texas
Pratt & Whitney, East Hartford, Connecticut
Lockheed Martin Aeronautical Systems, Marietta, Georgia
Lockheed Martin Skunkworks, Palmdale, California
Barron Associates, Charlottesville, Virginia
MUSYN Inc., Minneapolis, Minnesota

Aircraft Condition Analysis and Management System (ACAMS)

ARINC (Aeronautical Radio Incorporated), Annapolis, Maryland

Propulsion Instrumentation Working Group, Ohio
Northwest Airlines, Minneapolis, Minnesota
Southwest Airlines, Dallas, Texas
Delta Airlines, Atlanta, Georgia
USAirways Express, Arlington, Virginia
FedEx. Memphis, Tennessee
The Boeing Company, St. Louis, Missouri
Bombardier, Montreal, Canada
Symetrics, Melbourne, Florida

Active Management of Aircraft System Failure

Honeywell Technology Center, Minneapolis, Minnesota

Honeywell Business and Commuter Aviation Systems (BCAS), Phoenix, Arizona

Aircraft Situation Monitor (ASM)

Honeywell Commercial Aviation Systems, Phoenix, Arizona

Propulsion Health Management for Enhanced Safety

GE Aircraft Engines, Cincinnati, Ohio

GE Corporate Research Center and Development, Cincinnati, Ohio
Pennsylvania State University, State College, Pennsylvania
NASA Glenn Research Center, Cleveland, Ohio

Aerodynamic Database and Flight Simulation Assessment

Boeing Commercial Aircraft, Seattle, Washington

Health Monitoring for Airframe Structural Health Characterizations

ARINC (Aeronautical Radio Incorporated), Dayton, Ohio

Air Transport Association, Washington, D.C.
Northwest Airlines, Minneapolis, Minnesota
USAirways, Arlington, Virginia
Delta Airlines, Atlanta, Georgia
Bombardier, Montreal, Canada
DoD Air Force Aging Aircraft and Systems Office, Wright Patterson AFB, Ohio
F&S, Inc., Blacksburg, Virginia
Pennsylvania State University, State College, Pennsylvania
The Boeing Company, St. Louis, Missouri